

AMENDMENTS TO THE CLAIMS

1. (Previously Presented) A process for making a film of gallium nitride (GaN) starting from a substrate, by depositing GaN by vapour phase epitaxy, characterized in that the GaN deposit comprises at least one vapour phase epitaxial lateral overgrowth (ELO) step, and in that at least one of these ELO steps is preceded by etching of openings:

- either in a previously deposited dielectric mask,
- or directly in the substrate,

and in that an asymmetry is introduced into the dislocations environment during one of the ELO steps so as to cause the largest possible number of dislocation curvatures, since curved dislocations do not emerge at the surface of the GaN layer thus obtained wherein the asymmetry is induced:

(1) by varying growth parameters either by applying an electric field perpendicular to the growth axis, or applying a magnetic field, or by illuminating using a lamp producing UV radiation at about 170 to 400 nm, to cause preferential growth of a single family of facets {11-22}, or

(2) by making openings with unequal widths or with unequal geometry, either in the dielectric mask or directly in the substrate to apply geometric shapes to the GaN patterns to facilitate the curvature of dislocations.

2. (Cancelled)

3. (Previously Presented) The process according to claim 1, characterized in that asymmetry is introduced by making openings either in the dielectric mask or directly in the substrate, that are adjacent, unequal and asymmetric forming a basic pattern of a periodic network, the basic pattern comprising at least 2 openings.

4. (Previously Presented) The process according to claim 3, characterized in that the openings are lines, hexagons, triangles or a combination of these openings.

5. (Previously Presented) The process according to claim 3 or 4, characterized in that the periodic network extends along the [10-10] direction.
6. (Currently Amended) The process according to ~~any one of claims~~claim 1 or 3 to 5, characterized in that the at least one epitaxial lateral overgrowth (ELO) step(s) is ~~(are)~~ made by vapour phase epitaxy from chlorides and hydrides (HVPE), by OrganoMetallic pyrolysis in Vapour Phase Epitaxy (OMVPE), or by CSVT (Close Space Vapour Transport).
7. (Currently Amended) The process according to ~~any one of claims~~claim 1 or 3 to 6, characterized in that the at least one epitaxial later overgrowth (ELO) step(s) ~~are~~ is done along one of the C(0001), M(1-100), A(11-20), R(1-102), S(10-11) and N(11-23) planes of the substrate.
8. (Currently Amended) The process according to ~~any one of claims~~claim 1 or 3 to 7, characterized in that the substrate is chosen from among sapphire, ZnO, 6H-SiC, 4H-SiC, 3C-SiC, GaN AlN, LiAlO₂, LiGaO₂, MgAlO₄, Si, HfB₂ or GaAs.
9. (Previously Presented) The process according to claim 8, characterized in that the substrate is a sapphire substrate.
10. (Currently Amended) The process according to ~~any one of claims~~claim 1 or 3 to 9, characterized in that the gallium nitride is doped during at least one epitaxial lateral growth in vapour phase using a doping substance that can be chosen from among magnesium, zinc, beryllium, calcium, carbon, silicon, oxygen, tin and germanium.
11. (Currently Amended) The process according to ~~any one of claims~~claim 1 or 3 to 10, characterized in that an isoelectric impurity such as In, Sc, Sb, Bi is introduced in the gallium nitride.

12. (Currently Amended) The process according to ~~any one of claims 1 to 3~~ claim 1 to 11, characterized in that the openings are etched in a dielectric mask.

13. (Previously Presented) The process according to claim 12, characterized in that before deposition of the dielectric mask, a GaN base layer is made by vapour phase epitaxy from chlorides and hydrides (HVPE), by OrganoMetallic pyrolysis in Vapour Phase Epitaxy (OMVPE), or by CSVT (Close Space Vapour Transport).

14. (Previously Presented) The process according to claim 13, characterized in that the formation of the GaN base layer comprises the following steps:

- deposition of silicon nitride with a thickness approximately equal to one atomic plane,
- deposition of a GaN buffer layer,
- high temperature annealing at between 950 and 1120°C, such that the buffer layer changes from a continuous layer to a discontinuous layer formed of GaN patterns in the form of islands, then,
- deposition by epitaxy of GaN.

15. (Previously Presented) The process for making a film of gallium nitride (GaN) according to claim 12, characterized in that the process comprises two separate vapour phase epitaxial lateral overgrowth (ELO) steps, the GaN deposition during the first step is made in the GaN zones located in the openings, and the GaN deposition during the second step leads to lateral overgrowth until coalescence of the GaN patterns.

16. (Previously Presented) The process according to claim 15, characterized in that the GaN deposition during the first step is made under growth conditions such that the growth rate along the <1000> direction is greater than the lateral growth rate, and the GaN deposition during the second step is made under modified experimental conditions such that the lateral growth rate is greater than the growth rate along the <1000> direction so as to obtain full coalescence of patterns.

17. (Previously Presented) The process according to claim 16, characterized in that the modification of the growth conditions to obtain a lateral growth rate higher than the growth rate along the <1000> direction consists of adding magnesium, antimony or bismuth.

18. (Previously Presented) The process according to claim 1, characterized in that the openings are directly etched in the substrate.

19-22. (Cancelled)